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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,172	01/06/2009	Luhong Liang	42P22441	7338

8791 7590 06/23/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER	
HOANG, PHI	

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
06/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,172	LIANG ET AL.	
	Examiner	Art Unit	
	PHI HOANG	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *22 June 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chandley et al. (US 7,389,432 B2).

3. Regarding claim 1, Chandley discloses a computer implemented method, comprising: in a normal power state, directly storing pixels of a color plane of image data in a first segment and a second segment of a frame buffer; (Column 7, lines 31-39, it is well known that a frame buffer stores pixels of an image for display)

in a low power state, performing an error diffusion operation on the pixels to reduce a color depth of the pixels, (Column 9, lines 17-39 and column 10, lines 17-34)

the normal and low power states are independent and switchable from each other, (Column 8, lines 32-36)

and storing at least a portion of the pixels with reduced color depth in the first segment of the frame buffer without accessing the second segment of the frame buffer during the low power state (Column 9, lines 29-39, a portion of bits for a color can not be read out in order to reduce power consumption).

It would be obvious that each bit or set of bits would occupy segments within the frame buffer because modern memory systems are divided into an addressable space for locating, retrieving, or writing data to.

4. Regarding claim 2, Chandley discloses reducing power to the second segment of the frame buffer during the low power state (Column 9, lines 29-39, a color channel is shut off with a value of 0 at different points in time to reduce power consumption).

5. Regarding claim 3, Chandley discloses during the normal power state, fetching the pixels from the first and second segments of the frame buffer for display; (Column 1, lines 40-53 and column 9, lines 6-16)

and during the low power state, fetching the pixels with reduced color depth from the first segment of the frame buffer for display without accessing the second segment of the frame buffer (Column 9, lines 29-39, bits of a color channel are not retrieved).

6. Regarding claim 4, Chandley discloses the first segment is a most significant device (MSD) of the frame buffer and the second segment is a least significant device (LSD) of the frame buffer (Column 9, lines 29-39, 16 bits of a pixel during a refresh time are used as the "MSD" while the other 8 unused bits are the "LSD" of a 24 bit color pixel).

7. Regarding claim 5, Chandley discloses during the low power state, pixels with reduced color depth are used as data associated with the MSD for display (Column 9, lines 32-33, two channels for MSD) while a predetermined value is used as data

associated with the LSD for display without accessing the LSD of the frame buffer (A 0 is used for one color channel to reduce power consumption during a refresh).

8. Regarding claim 11, Chandley discloses the error diffusion operation is performed by an encoder implemented within at least one of software, a display controller, and a chipset of a data processing system (Column 7, lines 31-38).

9. Regarding claim 12, Chandley discloses a machine-readable medium (Column 3, lines 48-51) for storing instructions, when executed by a machine, cause the machine to perform a method, the method comprising: in a normal power state, directly storing pixels of a color plane of image data in a first segment and a second segment of a frame buffer; (Column 7, lines 31-39, it is well known that a frame buffer stores pixels of an image for display)

in a low power state, performing an error diffusion operation on the pixels to reduce a color depth of the pixels, the normal and low power states being independent and switchable from each other; (Column 9, lines 17-39 and column 10, lines 17-34)

and storing at least a portion of the pixels with reduced color depth in the first segment of the frame buffer during the low power state without accessing the second segment of the frame buffer (Column 9, lines 29-39, a portion of bits for a color can not be read out in order to reduce power consumption).

It would be obvious that each bit or set of bits would occupy segments within the frame buffer because modern memory systems are divided into an addressable space for locating, retrieving, or writing data to.

10. Regarding claim 15, Chandley discloses a display subsystem including a frame buffer having a first segment and a second segment, an encoder coupled to the frame buffer and configured to store pixels of a color plane of image data in the first and second segments of the frame buffer during a normal power state, (Figure 2 and column 7, lines 31-39, it is well known that a frame buffer stores pixels of an image for display)

perform an error diffusion operation on the pixels to reduce a color depth of the pixels during a low power state, (Column 9, lines 17-39 and column 10, lines 17-34)

the normal and low power states being independent and switchable from each other, (Column 8, lines 32-36)

and store at least a portion of the pixels with reduced color depth in the first segment of the frame buffer during the low power state without accessing the second segment of the frame buffer (Column 9, lines 29-39, a portion of bits for a color can not be read out in order to reduce power consumption).

It would be obvious that each bit or set of bits would occupy segments within the frame buffer because modern memory systems are divided into an addressable space for locating, retrieving, or writing data to.

11. Claims 6-10, 13, 14, and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chandley et al. (US 7,389,432 B2) in view of Zhang et al. (US 2006/0077489 A1).

12. Regarding claim 6, Chandley discloses performing an error diffusion operation on the pixels comprises: for each source pixel of each color plane of the image data,

calculating an output value corresponding to a source pixel value of the source pixel according to a predetermined algorithm (Column 9, lines 29-39, two channels of a source pixel are used during a refresh).

Chandley does not clearly disclose calculating an error between the output value and the source pixel value; and diffusing the error to up to two neighboring pixels of the source pixel.

Zhang discloses calculating an error between the output value and the source pixel value; and diffusing the error to up to two neighboring pixels of the source pixel (Page 5, paragraph 0052, lines 10-13).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Chandley to incorporate at error into nearby pixels as disclosed by Zhang because the color values of the nearby pixels can be visually compensated for the differences in color value of the source pixel resulting in an improved image.

13. Regarding claim 7, Chandley (Column 9, lines 40-44) in view of Zhang (Page 5, paragraph 0054, lines 5-13) discloses the up to two neighboring pixels are a right pixel and a bottom pixel of the source pixel.

14. Regarding claim 8, Zhang discloses diffusing the error to up to two neighboring pixels comprises adjusting pixel values of the up to two neighboring pixels with at least a portion of the error, wherein the portion of the error diffused to the neighboring pixel in an identical row is temporarily stored in a register and a portion of the error diffused to

the neighboring pixel in a next row is temporarily stored in a line buffer (Page 6, paragraph 0060, location of storage for pixel data is a design choice and does not affect the end result).

15. Regarding claim 9, Chandley discloses reducing color bits of each pixel with reduced color depth to fit within the first segment of the frame buffer prior to storing each pixel in the first segment of the frame buffer (Column 10, lines 17-34, 24 bit reduced to 8 bit).

16. Regarding claim 10, Chandley in view of Zhang discloses reducing color bits of each pixel with reduced color depth comprises: for each pixel of a color plane, arithmetically adding the error diffused from up to two neighboring pixels to an original value of a pixel, (Zhang, page 6, paragraph 0060) and storing a predetermined number of most significant bits (MSBs) of the output value in the first segment of the frame buffer (Chandley, column 10, line 30, 8 bits are only used).

17. Regarding claim 13, Chandley discloses for each source pixel of each color plane of the image data, calculating an output value corresponding to a source pixel value of the source pixel according to a predetermined algorithm (Column 9, lines 29-39, two channels of a source pixel are used during a refresh).

Chandley does not clearly disclose calculating an error between the output value and the source pixel value; and diffusing the error to up to two neighboring pixels of the source pixel.

Zhang discloses calculating an error between the output value and the source

pixel value; and diffusing the error to up to two neighboring pixels of the source pixel (Page 5, paragraph 0052, lines 10-13).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Chandley to incorporate at error into nearby pixels as disclosed by Zhang because the color values of the nearby pixels can be visually compensated for the differences in color value of the source pixel resulting in an improved image.

18. Regarding claim 14, Chandley in view of Zhang discloses reducing color bits of each pixel with reduced color depth to fit within the first segment of the frame buffer prior to storing each pixel in the first segment of the frame-buffer, including for each pixel of a color plane (Chandley, column 10, lines 17-25), arithmetically adding the error diffused from up to two neighboring pixels to an original value of a pixel (Zhang, page 6, paragraph 0060), and storing a predetermined number of most significant bits (MSBs) of the output value in the first segment of the frame buffer (Chandley, column 10, line 30, 8 bits are only used).

19. Regarding claim 16, Chandley discloses for each source pixel of each color plane of the image data, calculate an output value corresponding to a source pixel value of the source pixel according to a predetermined algorithm (Column 9, lines 29-39, two channels of a source pixel are used during a refresh).

Chandley does not clearly disclose calculating an error between the output value and the source pixel value, and diffuse the error to up to two neighboring pixels of the

source pixel.

Zhang discloses calculating an error between the output value and the source pixel value, and diffuse the error to up to two neighboring pixels of the source pixel (Page 5, paragraph 0052, lines 10-13).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Chandley to incorporate at error into nearby pixels as disclosed by Zhang because the color values of the nearby pixels can be visually compensated for the differences in color value of the source pixel resulting in an improved image.

20. Regarding claim 17, Chandley in view of Zhang discloses reducing color bits of each pixel with reduced color depth to fit within the first segment of the frame buffer prior to storing each pixel in the first segment of the frame buffer, including for each pixel of a color plane (Chandley, column 10, lines 17-25), arithmetically adding the error diffused from up to two neighboring pixels to an original value of a pixel (Zhang, page 6, paragraph 0060), and storing a predetermined number of most significant bits (MSBs) of the output value in the first segment of the frame buffer (Chandley, column 10, line 30, 8 bits are only used).

21. Regarding claim 18, Chandley discloses a computer implemented method, comprising: during a low power state of a frame buffer having a first segment and a second segment, for each source pixel of each color plane of image data, calculating an output value corresponding to a source pixel value of the source pixel according to a

predetermined algorithm (Column 9, lines 29-39, two channels of a source pixel are used during a refresh)

and storing the output value of the source pixel without accessing the second segment of the frame buffer during the low power state of the frame buffer (Column 9, lines 29-39, a portion of bits for a color can not be read out in order to reduce power consumption).

Chandley does not clearly disclose calculating an error between the output value and the source pixel value; diffusing the error to up to two neighboring pixels of the source pixel; and storing the diffused up to two neighboring pixels to the first segment of the frame buffer without accessing the second segment of the frame buffer during the low power state of the frame buffer.

Zhang discloses calculating an error between the output value and the source pixel value; diffusing the error to up to two neighboring pixels of the source pixel (Page 5, paragraph 0052, lines 10-13).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Chandley to incorporate at error into nearby pixels as disclosed by Zhang because the color values of the nearby pixels can be visually compensated for the differences in color value of the source pixel resulting in an improved image.

It would have been obvious to store the diffused pixels in the buffer of Chandley in a low power state.

22. Regarding claim 19, Chandley discloses reducing color bits of each output value and the up to two neighboring pixels to fit within the first segment of the frame buffer before being stored in the first segment of the frame buffer (Column 10, lines 17-34, 24 bit reduced to 8 bit; furthermore, it would be obvious to store neighboring pixels as well in a frame buffer).

23. Regarding claim 20, Chandley in view of Zhang discloses for each pixel of a color plane, arithmetically adding the error diffused from up to two neighboring pixels to an original value of a pixel (Zhang, page 6, paragraph 0060), and storing a predetermined number of most significant bits (MSBs) of the output value in the first segment of the fame buffer (Chandley, column 10, line 30, 8 bits are only used).

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Aleksic et al. (US 2004/0150647 A1) System for Displaying Video on a Portable Device and Method thereof.

Paver et al. (US 7,245,945 B2) Portable Computing Device Adapted to Update Display Information while in a Low Power Mode.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHI HOANG whose telephone number is 571-270-3417. The examiner can normally be reached on Mon-Fri, 8:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on 571-272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Phi Hoang/
Examiner, Art Unit 2628
June 19, 2009

/XIAO M. WU/
Supervisory Patent Examiner, Art Unit 2628